

REMARKS

This RCP amendment responds to the Final Office Action dated 10/04/05 made in the parent application, containing new Claims 9 and 10.

The invention relates to a stationary phase having both ion-bearing and hydrophobic functional groups that are chemically bonded together and to a stationary support in a specifically arranged manner, suited for successful liquid chromatography (LC) of small molecules.

More specifically, the new Claims 9 and 10 are directed to a stationary phase having a support surface, with both ion bearing and hydrophobic functional groups chemically connected together, with only the ion bearing group being attached to the support surface so that the hydrophobic functional group is held relative to the support surface only via its connection to the ion bearing functional group and further is located remotely of the ion bearing group to overlie and form a permeable stationary layer over the ion group to shield the ion bearing group from direct contact with the related HPLC mobile phase. The hydrophobic functional group consists of a carbon chain at least eight carbon atoms long.

The claims are believed to overcome the final rejections of the old Claim 8 under both 35 USC 102 and 35 USC 103, which held

that the claimed invention was anticipated by or was unpatentable as being obvious in view of the teachings of Talley; or as being obvious in view of the teachings of Talley when combined with the teachings of Snyder; or as being obvious in view of the teachings of Ayers when combined with the teachings of O'Gara.

The 102 rejection is believed totally inappropriate and overcome as the new claims call for a hydrophobic carbon chain having at least 8 carbons, or 12 carbons in Claim 10, while Talley specifically restricts any disclosed carbon chain to at most 4 carbons long.

The 103 rejections are also believed inappropriate and overcome, as the pending claims recite a unique combination of components not shown or suggested by any of these references.

The commonality of these rejections is that LC technology has utilized related or identical ligand components (ion-bearing and hydrophobic functional groups) for 30 years, and if any differences existed between the claimed ligand combination and the references, it would have been obvious to "optimize" these prior teachings or combinations in order to enhance the LC separation, thereby anticipating the claimed invention.

However, 103 rejections can be overcome for many reasons, including the ages of the different references that are combined and unexpected operational results and/or commercial success of

the inventive combination, each of which exists within this the claimed invention of this application.

To overcome the rejection, this response establishes that the invention is not only patentable, but may hint at being revolutionary due to its unexpected technical advances and its commercial success, and includes:

A discussion differentiating this claimed invention from the references; and

A 132 Declaration of one of the inventors outlining some history: of the invention and its assignee, of its PRIMESEP columns incorporating the invention, of the exploding commercial column sales, and of sample chat room comments from column users in real world LC challenges confirming both the unexpected and successful results achieved with the inventive columns, submitted at:
www.sepsci.com/chromforum/viewtopic.php?t=1479&start=0 .

As the 103 rejections have noted already several times, these references and the science of liquid chromatography have been known for thirty years, but they breezes over or ignore the rather obvious (to the undersigned) contradiction in this mix and match combination of the components, that such had never been done before applicants' now claimed invention. These rejections should be overcome in view of the unexpected benefits and strong sales growth noted in the accompanying Declaration.

Regarding the specific rejections, Talley is directed to molecular exclusion chromatography or gel filtration, that

requires minimum interaction of analytes with a stationary phase surface. To achieve this, the surface are made hydrophilic (vs. hydrophobic) and are positively charged to repel cationic polymers. There is no attractive interaction between the stationary phase and solute, but molecular exclusion occurs due only to the size of molecules where larger molecules pass through the stationary phase at a faster rate than smaller molecules. On the other hand, the claimed invention operates by attractive equilibration between the mobile and stationary phases for solute separation, where the molecule sizes are of no concern, and is suited for separating small molecules.

Talley further limits the hydrocarbon chain to between one and four carbon units, while the claimed said hydrophobic functional group is to have a carbon chain at least eight carbon atoms long. Talley neither discloses nor suggests that a longer carbon chain would achieve any additional benefits in or toward adsorption chromatography.

The claimed arrangement thus is not only totally different from the Talley arrangement; but as Talley specifically set the lower carbon unit limits, it appears inappropriate to reject the claim on the basis that it would be obvious to "optimize" the Talley elements to achieve the claimed arrangement. Also, if Talley's restricted carbon chain were "optimized" to a longer carbon chain, reliable size-exclusion likely would be precluded.

Accordingly, the undersigned respectfully urges that the Talley rejection is overcome and should be removed.

Another 103 rejection of the invention was that it was unpatentable over Ayers in view of O'Gara. The rejection suggested that as Ayers showed a stationary phase with a hydrophobic group as a ligand, and as O'Gara showed octadecyl and octyl groups as traditional reverse phase ligands in use for the past 30 years, it would be obvious to use the traditional reverse phase ligands of octadecyl and octyl in the Ayers stationary phase. This modified combination would anticipate and/or function the same as the claimed stationary phase.

Ayers is directed to affinity chromatography, a separation based on attachment of special ligand to the stationary phase which has high affinity to the analyte. This separation is based on recognition principally very specific toward unique molecules, primarily in the separation of bio-molecules, and otherwise is not in universal use.

The Ayers stationary phase utilizes ion bearing and hydrophobic functional groups connected together; however the connection is in a manner opposite to that of the claimed invention, where the Ayers hydrophobic group is bonded to the stationary phase surface and the ion bearing group then overlies the hydrophobic group. This could be pretty much the same as the claimed invention, but its inside-out. In this arrangement, the

Ayers hydrophobic group performs only as a flexible linkage in holding the ion bearing group relative to the stationary phase surface, and does not participate in the separation process.

O'Gara is directed to adsorption chromatography, having a polar group embedded within a hydrophobic stationary layer. The embedded polar group is not ion-bearing, which is significantly different from the current invention. The O'Gara material would not interact with charged analytes, as the current invention does with its ion-exchange mechanism.

Adding the O'Gara thirty year old technology of using octadecyl and octyl groups as traditional reverse phase ligands to the reversed orientation of the Ayers interconnected ion bearing and hydrophobic functional groups, would yet not yield the stationary phase recited in the new Claim 9.

Further, the ionic and hydrophobic functional groups arranged as claimed in Claims 9 and 10 provide dual interactive or reverse phase synergy of both hydrophobic and electrostatic separation forces, for more efficient separation.

The thirty year background of using related components, but not in the combination of this invention, is strong evidence that the claimed invention is not obvious, but represents a significant invention over the cited prior art.

Having both an ionic (ionizable) group and a hydrophobic functional group, as claimed in this invention, makes possible a

dual interactive synergy of both hydrophobic and electrostatic forces working in the separation.

The O'Gara polar imbedded group is a component of many bonded phases for HPLC (figure 2), but such are non ionic.

Evidence relating to the commercialization of the invention is being submitted in the 132 Declaration, noting how the Assignee of this application has been making and selling PRIMESEP columns based on the pending claim, and how the columns being well received commercially.

Even if the same individual components were used for 30 years, the exact claimed combination of new Claim 9 was neither disclosed nor suggested by these references. This fact when combined with the commercial success of the invention should be effective to overcome the 103 rejections of Claim 9. The claimed invention is believed not only non-obvious but a significant patentable advance in LC technology.

Alternatively, continued 103 rejection of the claim as being obvious, with 30 year old art, might suggest that the Examiner is using the hindsight wisdom of Applicants' own disclosure as justification for the rejections.

One additional factor useful in negating the 103 rejection centers on the fact that as the patent laws require that an applicant disclose the best mode of practicing a claimed invention, each reference applicant, at the time of his filing,

had to believe that the submitted disclosure was the best for his respective type of separation analysis, and did not at that time or later perceive added benefit or column effectiveness could accrue by modifying the column fill to that of Claim 9.

Favorable consideration of the RCP application as now presented is requested. The undersigned would welcome the examiner's call to arrange an interview with the inventors, which most certainly we believe would be helpful in a complete examination.

Respectfully submitted,

A handwritten signature in cursive script, reading "Charles F. Lind". The signature is written in dark ink and is positioned above the printed name.

Charles F. Lind

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